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deserts and plains of Utah, Nevada, Western Colorado, New Mexico, Arizona and southwestward to Lower California, and may hence be appropriately termed the *Campestrian Region*. The annual rainfall is generally below fifteen inches, but ranges, at different localities, from three inches to twenty. Here a general paleness of color is the distinctive feature. The fifth region begins on the Pacific Coast at about the 40th parallel, embracing a comparatively narrow belt along the coast from Northern California to Sitka. Its peculiarities are most strongly developed west of the Cascade Range, north of 45°; they also prevail eastward nearly or quite to the main chain of the Rocky Mountains. It may hence be termed the *Columbian Region*. With an average annual rainfall of fifty-five to sixty-five inches, the prevalent tendency in color is to dusky and fuscous rather than rufous tints. The district between the Cascade Range and the main chain of the Rocky Mountains presents features that may almost entitle it to rank as a distinct region, as might also the region of maximum rainfall in the Mississippi Region. The southern half of Florida is also perhaps entitled to recognition as a distinct region, being characterized by excessive humidity and a subtropical intensity of color. It may also be necessary eventually to recognize as distinct districts the almost rainless portions of the *Campestrian Region*."

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After looking at the subject in this broad way the reader need not feel surprised at the suppression of a good many nominal species. In 1857 Professor Baird reduced the number of species of *Sciurus* from twenty-four to ten, with two doubtful ones; Mr. Allen now reduces them to *five*, with seven geographical varieties in addition. The number of North American species of *Sciuridæ* in all is twenty-five.

## B O T A N Y .

THE STARCH OF ZAMIA.--The roots of *Zamia pumila* yield a large per cent. of starch. The plant grows abundantly at the head of Biscayne Bay, Florida. I also found it, though not abundantly, at New Smyrna and Cedar Keys, Florida. The soil at the head of Biscayne Bay is full of loose pieces of limy rocks; between the interstices of these the plant grows; this kind of soil suits it best. The leaves have the general appearance of ferns; its roots are rough, of a gray color, and of the shape and size of parsnips. Not only is it abundantly reproduced from seed, but any piece left in the ground grows. It could be cultivated and made profitable.

The root yields two kinds of starch, white and yellow ; also a poisonous substance. The white starch is very nutritious and makes excellent puddings, much nicer than sea moss, farina or corn starch ; in fact, it is equal to any starch for domestic or manufacturing purposes. The yellow starch is much lighter than the white, and can be easily separated.

The roots yield a larger per cent. of white starch during the dry season, when the plant is at rest ; when growing it produces more yellow starch. If used at this period a good slice is taken off the top and bottom, containing mostly yellow starch, which is feed to chickens and hogs. They, however, never get fat, as the substance contains but little nourishment. If the root is used in the dry or resting season, the very tip of the root is taken off, and a very thin slice with the leaves.

After the roots are washed clean and deprived of the necessary slice from top and bottom, they are then ground into a pulp, mixed with water and which is passed through a screen. This process carries off the poisonous matter as it is run off. The yellow, being so light and not adhesive to the white starch, is easily taken off. Both kinds dry easily in the sun. If the water and starch remain together long, fermentation takes place, and the two grades of starch will not separate. It is therefore best to grind the roots quickly, draw off the water and separate the starches promptly, as a pure white article is required for commerce.

The Seminole Indians make but little starch for sale ; they have not the facilities for separating and drying ; but they make a good deal for their own use, as they are not particular about leaving the less nutritious yellow with the white. The Indians make it into mush, either separate or mixed with flour ; they also make bread of it, using the starch mixed with corn meal or flour. There are several mills among the white settlers of Biscayne Bay for the manufacture of this starch.

The seed of this plant is covered with a bright orange pulp, which, if eaten, has a dangerous narcotic effect. The leaves of the *Zamia* are the favorite food of that beautiful butterfly *Eumæus Atala*, which surpasses in beauty all other butterflies of Biscayne Bay ; it is more numerous than any other ; it is not exaggeration to say that it equals in number all the other species of butterflies in that region. They fly low, with a slow, measured motion,

alighting rather suddenly upon the leaves, are taken easily, as they are not shy nor easily disturbed. This plant is very common in the pine woods; often in botanizing I have seen but few other plants, consequently the *Atala* would be very numerous. Often three or four occur on one plant. Their eggs, well-matured pupæ, cocoons and caterpillars, are found upon the same plant.

This plant is commonly called *Compte*, and the starch goes by that name, while the *Atala* butterfly is called "*Compte* Moth." The inhabitants readily recognize the caterpillars, as they and their parent are unlike any other of the butterflies of Biscayne Bay. Several chrysalides were placed in a box, part of them had nearly completed their transformation, others were not so advanced. The first hatched in five days, the others in seven days. Whether they would have hatched in that time if left upon the plant is more than I can tell. I noticed this insect feeding upon the banana leaves in the gardens, but upon no other plant did it seem to feed, other than its natural one, the *Zamia pumila*. — E. PALMER.

## ZOOLOGY.

ON AN UNDESCRIBED ORGAN IN *LIMULUS*, SUPPOSED TO BE RENAL IN ITS NATURE.<sup>1</sup>—In dissecting the king crab one's attention is directed to a large and apparently important gland, conspicuous from its bright red color contrasting with the dark masses of the liver and the yellowish ovary or greenish testes, and presenting the same appearance in either sex. The glands are bilaterally symmetrical, one situated on each side of the stomach and beginning of the intestine, and each entirely separate from its fellow. One of these glands consists of a stolon-like mass, running along close to the great collective vein, and attached to it by irregular bands of connective tissue, which also holds the gland in place. From this horizontal mass, four vertical branches arise, and lie between and next to the partitions at the base of the legs, dividing the sides of the body into compartments. The posterior of these four vertical lobes accompanies the middle hepatic vein from its origin from the great collective vein, and is sent off opposite the insertion of the fifth pair of feet. Half-way between the ori-

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<sup>1</sup> Read at the Philadelphia Meeting of the National Academy of Sciences, held in Nov., 1874.